UCT-0036

REMARKS

Claims 1-5 and 7-11 and are pending in the present application. Claims 6 and 12-20 have been withdrawn, claims 1, 8, 10 have been amended, claims 12, 13 and 15-20 have been cancelled, and claims 21-27 have been added, leaving Claims 1-5, 7-11, and 21-27 for consideration upon entry of the present Amendment.

Support for the amendment to claim 1 can be found in the Specification in Paragraph 9.

Support for the amendment to claim 8 can be found in the Specification in Paragraph 17.

Support for the amendment to claim 10 can be found in the Specification in Paragraph 11.

Support for new claim 21 can be found in claims 1 and 8 as filed and in the Specification in Paragraph 17.

Support for new claim 22 can be found in claim 3 as filed.

Support for new claim 23 can be found in claim 4 as filed.

Support for new claim 24 can be found in claim 5 as filed.

Support for new claim 25 can be found in claim 7 as filed.

Support for new claim 26 can be found in claim 9 as filed.

Support for new claim 27 can be found in claim 11 as filed.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims is respectfully requested in view of the above amendments and the following remarks.

Information Disclosure Statement

Applicants thank the Examiner for pointing out the error in the information disclosure statement. The proper reference is US 6,300,502 to Kannan et al. An IDS citing this reference is submitted herewith.

Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 1-5, 7-11 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner appears to be confused by the

language "point volume of activation". Applicants are confused as to why the Examiner has looked to the Campagnola Macromolecules 2000 paper to interpret the claims.

As described in the Specification on Page 16, paragraph 23, the method is suitable for the formation of structures "built up from elements with point volumes having dimensions of less than about 1 micron". Also as described in paragraph 23, two photon wide field excitation allows the formation of structures having individual point volumes with "X-Y dimensions of less than about 300 nm and optionally a Z-dimension of less than about 500 nm" while three-photon far field excitation allows the formation of structures comprising individual point volumes with "X-Y dimensions of less than about 250 nm and optionally a Z-dimension of less than about 300 nm.

The Examiner is reminded that the claimed method is a photochemical method. As is clearly known to one of skill in the art, the point volume of activation is the point volume of the source used to initiate the photochemistry. As explained in paragraph 23, two photon wide field activation and three-photon far field activation can be used to give point volumes of activation in the claimed range. Further, because the process is a photochemical process, photochemistry occurs substantially within the volume of the excitation provided. As would be clearly understood to one of skill in the art, the point volume of the features produced is substantially the same as the point volume of excitation used to produce the feature. Thus, the point volume of activation refers to the excitation used to produce a feature, while the point volume of the feature is the volume of the feature itself. Inherent in the method is that the point volume of activation is substantially the same as the point volume of the feature produced by the excitation. With respect to claims 1-5 and 7-11, these claims refer to the "point volume of activation", which clearly refers to the point volume of the multi-photon excitation used to perform the photoactivation.

For at least the foregoing reasons, reconsideration and withdrawal of this rejection under 35 U.S.C. § 112, second paragraph are requested.

The Examiner then goes on to note several portions of the Specification which the Examiner has interpreted.

(a) Applicants are unclear as to why the Examiner has defined "Suitable" as this term does not appear in the claims and is said by the Examiner to "not limit the claim language".

(b) The Examiner has pointed out the claim limitation "substantially water-soluble" as claimed in claim 3 of the application. The Examiner has correctly pointed to the definition of this term from the specification. Applicants however are unclear as to why the Examiner has taken the term "effective" to be related to the point volume of activation having at least one dimension less than 1 micron as this is not required by the definition. The definition of water soluble does not require effective crosslinking within a particular point volume. The Examiner is, however, correct that the water solubility is an inherent property of the photoactivatable crosslinker.

(c) Applicants concur with the Examiner's understanding of aqueous solutions, although because this term is not used in the claims, Applicants are unsure as to why the Examiner has addressed this particular term.

(d) Applicants are unclear as to why the Examiner has pointed to paragraph 20 and "derivatized and synthetic variations" as these terms do not appear in the claims.

(e) Applicants appreciate the Examiner's note with regard to incorporation by reference.

(f) Applicants are unclear as to why the Examiner has pointed to paragraph 42.

Claims 8-10 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner refers to the structures in Claim 8. It appears that Claim 8 as filed had a typographical error. Claim 8 has been amended for consistency with the Specification.

Claim 10 stands rejected as allegedly indefinite for the use of A1, A2 and/or Q. Claim 10 has been amended for consistency with the specification.

Reconsideration and withdrawal of the foregoing rejections under 35 U.S.C. § 112, second paragraph, are requested.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 1 and 4 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by Vallee et al (6,008,265). Applicants respectfully traverse this rejection.

UCT-0036

Present claim 1 is directed to a method for crosslinking one or more molecules, comprising photoactivating a photactivatable crosslinker in the presence of the one or more molecules by multi-photon excitation, wherein the crosslinker comprises at least two photoactive groups covalently linked by a bridging moiety, and further wherein the point volume of the activation has at least one dimension of less than about 1 micron; and crosslinking the one or more molecules with the activated crosslinker, wherein the crosslinking produces a three-dimensional structure.

Vallee et al. is directed to ionic compounds useful as photoinitiators of cationic polymerization of polymers which can be used as photoresists in photolithography. (Col. 1, ll. 9-13) In the process of polymerization, the ionic compounds are mixed with at least one monomer and subject to actinic or beta-radiation. (Col. 14, ll. 29-38) Ultraviolet radiation is preferred. (Col. 15, ll. 50-51) In Example 16, a 0.5 micron thick coat of a photoinitiator and a monomer were irradiated with a KrF laser through an interferential mask. (Col. 23, ll. 32-41) There is no teaching or suggestion of the use of multi-photon excitation for the irradiation or the production of three-dimensional structures. Multi-photon excitation cannot be performed with a standard KrF laser.

In making the rejection, the Examiner points to Example 16 of Vallee et al . which allegedly teaches crosslinking with a point volume of at least one dimension of less than 1 micron. (paper 200501718, page 10)

To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987). The method of the present claims requires the use of multi-photon excitation to photoactivate the crosslinker. Vallee et al. neither teach nor suggest the use of multi-photon excitation in their photopolymerization reactions. In addition, present claim 1 is directed to producing a three-dimensional object, while photolithography as taught by Vallee et al. produces two-dimensional structures. Because Vallee et. al. is missing elements of the present claims, it does not anticipate the present claims. In addition, because there is no teaching or suggestion of the use of one-photon or multi-photon excitation in Vallee et al., this reference also fails to render the present claims obvious.

For at least the foregoing reasons, reconsideration and withdrawal of the previous rejection under 35 U.S.C. § 102(b) are requested.

UCT-0036

Claims 1-2 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by Yang et al (SPIE) as optionally evidenced by Dean (Lange's Handbook of Chemistry 15th ed.). Applicants respectfully traverse this rejection.

Yang et al. is directed to a photolithography method in which 3,3'-diaminobenzophenone or 3,3' diazidophenyl sulfone are used as photactive components. (p. 120) The light source for photolithography was a high-pressure mercury arc lamp. (p. 119) There is no teaching or suggestion of the use of multi-photon excitation for the irradiation or the production of three-dimensional structures. Multi-photon excitation cannot be performed with an arc lamp.

In making the rejection, the Examiner points to the use of 3,3'-diaziobenzophenone or 3,3' diazidophenyl sulfone on p.120 of Yang et al. The Examiner also points to the line-space widths of the photoresist produced in Yang et al. as evidence that there was a point volume of activation of less than 1 micron. (paper 200501718, page 11)

The method of the present claims requires the use of multi-photon excitation to photoactivate the crosslinker. Yang et al. neither teach nor suggest the use of multi-photon excitation in their photopolymerization reactions. In addition, present claim 1 is directed to producing a three-dimensional object, while photolithography as taught by Yang et al. produces two-dimensional structures. Because Yang et. al. is missing elements of the present claims, it does not anticipate the present claims. In addition, because there is no teaching or suggestion of the use of one-photon or multi-photon excitation in Yang et al., this reference also fails to render the present claims obvious.

Applicants also note that in the Examiner's discussion of Yang, the Examiner points to the definition of chromophore and concludes that the 3,3'-diazidophenyl sulfone is a crosslinker as claimed in the present application. (paper 200501718, pages 11-12) Applicants respectfully point out that the claims are directed to crosslinkers having two photoactive groups, wherein photoactive groups are defined as groups that decompose to form free radicals or otherwise cause the formation of free radicals that initiate crosslinking. (Specification, Paragraph 10) Not all chromophores are photoactivatable. With regard to 3,3'-diazidophenyl sulfone and the other crosslinkers as disclosed in Yang et al., these molecules themselves are photoactive groups that have two chromophores. This is not what is claimed in the present application. The crosslinker

of the present claims comprises two photoactive groups covalently joined to a bridging moiety. Thus, 3,3'-diazidophenyl sulfone is not a crosslinker as presently claimed.

For at least the foregoing reasons, reconsideration and withdrawal of the previous rejection under 35 U.S.C. § 102(b) are requested.

Claims 1, 3, 7 and 11 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by Nomura et al. (4,131,466), or in the alternative under 35 U.S.C. § 103(a) as allegedly obvious over Nomura et al.

Nomura et al. is directed to a photolithographic method in which a layer comprises a gelatin and a condensation product formed between a diazonium salt of a para-aminodiphenylamine derivative and an aldehyde. (Abstract) In example 1, for example, irradiation was performed with a mercury lamp. (Col. 11, ll. 59-66) There is no teaching or suggestion of the use of multi-photon excitation for the irradiation or the production of three-dimensional structures. Multi-photon excitation cannot be performed with a mercury lamp.

In making the rejection, the Examiner points to the crosslinking system of Nomura et al. as described in Col. 3. (paper 200501718, page 14)

The method of the present claims requires the use of multi-photon excitation to photoactivate the crosslinker. Nomura et al. neither teach nor suggest the use of multi-photon excitation in their photopolymerization reactions. In addition, present claim 1 is directed to producing a three-dimensional object, while photolithography as taught by Nomura et al. produces two-dimensional structures. Because Nomura et. al. is missing elements of the present claims, it does not anticipate the present claims. In addition, because there is no teaching or suggestion of the use of one-photon or multi-photon excitation in Nomura et al., this reference also fails to render the present claims obvious.

For at least the foregoing reasons, reconsideration and withdrawal of the previous rejection under 35 U.S.C. § 102(b) are requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claim 1 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Wright et al. (4,503,140). Applicants respectfully traverse this rejection.

Wright et al. is directed to radiation-sensitive polymers suitable for coating as a layer. (Abstract) Crosslinking can take place, for example, between a polymer having nucleophilic groups and an organic compound substituted by two or more pi-bonded metal-carbonyl groups. (Col. 5, ll. 1-40) In Examples 23-35, irradiation is performed with a mercury lamp to produce a crosslinked product. (Col. 18, ll. 1-57) There is no teaching or suggestion of the use of multi-photon excitation for the irradiation or the production of three-dimensional structures. Multi-photon excitation cannot be performed with a mercury lamp.

In making the rejection, the Examiner points to Examples 23-25 of Wright et al. in which polymer are irradiated with a mercury lamp. (paper 200501718, page 10-11)

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was make. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

The method of the present claims requires the use of multi-photon excitation to photoactivate the crosslinker. Wright et al. neither teach nor suggest the use of multi-photon excitation in their photopolymerization reactions. In addition, present claim 1 is directed to producing a three-dimensional object, Wright et al. teaches the production of coatings that are two-dimensional structures. Because Wright et. al. is missing elements of the present claims, it does not render obvious the present claims.

For at least the foregoing reasons, reconsideration and withdrawal of the previous rejection under 35 U.S.C. § 103(a) are requested.

Claims 1-2 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Goodman et al. (WO 99/54784). Applicants respectfully traverse this rejection.

Goodman et al. is directed to the use of multi-photon excitation to fabricate structural features having dimensions of less than about 1 micron. (Abstract)

In making the rejection, the Examiner points to page 15 of Goodman et al. in which bisarylazides are disclosed as possible crosslinkng agents. (paper 200501718, page 14)

The present claims are directed to a crosslinker comprising at least two photoactive groups linked by a bridging moiety. As explained earlier in this response, photoactive groups are defined as groups that decompose to form free radicals or otherwise cause the formation of free radicals that initiate crosslinking. (Specification, Paragraph 10) Bisarylazides are themselves photoactive groups, thus two such groups would be required to form the crosslinker of the present claims. Goodman et al. does not disclose the crosslinker comprising at least two photoactive groups linked by a bridging moiety as presently claimed and thus does not render the present claims obvious.

For at least the foregoing reasons, reconsideration and withdrawal of the previous rejection under 35 U.S.C. § 103(a) are requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance is requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130

Respectfully submitted,

CANTOR COLBURN LLP

By Karen A. LeCuyer
Karen A. LeCuyer
Registration No.51,928

Date: November 29, 2005
Customer No.: 23413
Telephone: (860) 286-2929